

C<sup>1</sup>

1 1. (Twice Amended) Apparatus for tightly-coupling hardware data encryption functions  
2 with software-based protocol decode processing within a pipelined processor of a program-  
3 mable processing engine in a network switch, the apparatus comprising:  
4 an encryption execution unit contained within the pipelined processor;  
5 an ALU, in response to reading an op-code, enables the encryption execution unit to  
6 read data from a memory shared by the ALU and the pipelined processor, and for the en-  
7 cryption execution unit to process the data read from the shared memory; and  
8 a multiplexer to select as an output the result of processing by the encryption execu-  
9 tion unit rather than a result of ALU processing.

C<sup>2</sup>

1 10. (Twice Amended) A method for tightly-coupling hardware data encryption functions  
2 with software-based protocol decode processing within a pipelined processor of a program-  
3 mable processing engine in a network switch, the method comprising the steps of:  
4 providing an encryption execution unit within the pipelined processor;  
5 enabling, by an ALU in response to reading an op-code, the encryption execution unit  
6 to read data from a memory shared by the ALU and the pipelined processor, and for the en-  
7 cryption execution unit to process the data read from the memory; and  
8 selecting as output the result of processing by the encryption execution unit rather  
9 than selecting results from the ALU.

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1 20. (Amended) A programmable processing engine of a network switch comprising:

2 an input header buffer;  
3 an output header buffer; and  
4 a plurality of processing complex elements symmetrically arrayed into rows and col-  
5 umns that are embedded between the input header buffer and an output header buffer, each  
6 processing complex element comprising a microcontroller core having an encryption tightly  
7 coupled state machine (TCSM) unit that is selectively invoked in response to the microcon-  
8 troller reading an op-code; and  
9 a selector to select an output from either the microcontroller OR the TCSM.

1 21. (Amended) A pipelined processor in a network switch, the processor comprising:  
2 an ALU internal to the processor responsive to a first set of opcodes;  
3 an encryption execution unit internal to the processor having an encryption tightly  
4 coupled state machine (TCSM) responsive a second set of opcodes, the ALU, in response to  
5 an op-code, transferring processing to the encryption execution unit to process  
6 in response to said second set of opcodes;  
7 a multiplexer to select output from the ALU OR from the encryption execution unit.

1 27. (Amended) A method for providing encryption functions within a pipelined processor in  
2 a network switch, the method comprising the steps of:

3 associating a first set of opcodes with an ALU internal to the processor;  
4 associating a second set of opcodes with an encryption execution unit internal to the  
5 process or having an encryption tightly coupled state machine (TCSM), wherein protocol  
6 processing operations are performed by the ALU and encryption operations are performed by  
7 the encryption execution unit in response to said second set of opcodes; and  
8 transferring by the ALU, in response to an op-code, processing to the encryption exe-  
9 cution unit to process encryption operations in response to said second set of opcodes;  
10 selecting output from the ALU OR from the encryption execution unit.

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1 33. (Amended) A computer readable media, comprising: said computer readable me-  
2 dia containing instructions for execution in a processor for the practice of the method of  
3 claim 10 or claim 27 or claim 40.

1 34. (Amended) Electromagnetic signals propagating on a computer network, com-  
2 prising: said electromagnetic signals carrying instructions for execution on a processor for  
3 the practice of the method of claim 10 or claim 27 or claim 40.

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Please Add New Claims 35, *et al.* as follows

1 35. (New) A router, comprising:  
2 a processor having an ALU for processing op-codes and a tightly coupled state ma-  
3 chine (TCSM) for performing encryption processing;  
4 a shared memory for providing data to either the ALU or the TCSM;  
5 the ALU, in response to reading an op-code, transferring processing to the TCSM,  
6 and the TCSM performing encryption processing on data read from the shared memory;  
7 a selector to select as output results from the ALU OR results from the TCSM.

1 36. (New) The apparatus of Claim 35, further comprising:  
2 the selector is a multiplexer.

1 37. (New) The apparatus of Claim 35, further comprising:  
2 the ALU selects whether the ALU or the TCSM reads data from the memory.

1 38. (New) The apparatus of Claim 35, further comprising:  
2 the TCSM performs DES data encryption standard encryption processing.

- 1 39. (New) The apparatus of Claim 35, further comprising:  
2 a sub-key generation component to provide a key to the TCSM.

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cont
- 1 40. (New) A method for operating a router, comprising:  
2 providing a processor having an ALU for processing op-codes and a tightly coupled  
3 state machine (TCSM) for performing encryption processing;  
4 reading data from a shared memory by either the ALU or the TCSM;  
5 transferring processing by the ALU, in response to reading an op-code, to the TCSM,  
6 and the TCSM performing encryption processing on data read from the shared memory;  
7 selecting as output results from the ALU OR results from the TCSM.

- 1 41. (New) The method of Claim 40, further comprising:  
2 using a multiplexer for selecting as output results from the ALU OR results from the  
3 TCSM.

- 1 42. (New) The method of Claim 40, further comprising;  
2 selecting by the ALU whether the ALU or the TCSM reads data from the memory.

- 1 43. (New) The method of Claim 40, further comprising:  
2 performing DES data encryption standard encryption processing by the TCSM.

- 1 44. (New) The method of Claim 40, further comprising:  
2 providing key to the TCSM by a sub-key generation component.

- 1 45. (New) A router, comprising:  
2 means for providing a processor having an ALU for processing op-codes and a tightly  
3 coupled state machine (TCSM) for performing encryption processing;  
4 means for reading data from a shared memory by either the ALU or the TCSM;  
5 means for transferring processing by the ALU, in response to reading an op-code, to  
6 the TCSM, and the TCSM performing encryption processing on data read from the shared  
7 memory;  
8 means for selecting as output results from the ALU OR results from the TCSM.

- 1 46. (New) The apparatus of Claim 45, further comprising:

2 means for using a multiplexer for selecting as output results from the ALU OR results  
3 from the TCSM.

1 47. (New) The apparatus of Claim 45, further comprising;

2 means for selecting by the ALU whether the ALU or the TCSM reads data from the  
3 memory.

1 48. (New) The apparatus of Claim 45, further comprising:

2 means for performing DES data encryption standard encryption processing by the  
3 TCSM.

1 49. (New) The apparatus of Claim 45, further comprising:

2 means for providing key to the TCSM by a sub-key generation component.

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